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(56) Documents Cited
GB 2319600 A **GB 2309660 A** **GB 2130715 A**
WO 95/20440 A1 **WO 95/17992 A1** **US 5356245 A**
US 5033917 A

(58) Field of Search
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INT CL^6 **B08B 15/04 , B23B 47/34 , B23Q 11/00 , B25D 17/14 17/18 17/20 17/28**

(54) Abstract Title
Apparatus for guiding a power drill

(57) Apparatus for guiding a hand-held power drill comprises a housing 3, 6 provided with means (eg. a collar 11) for attachment to a power drill such that the housing can be rested on and steadied relative to a workpiece during drilling. The housing and workpiece thereby define a cavity which receives the waste material produced by drilling and the housing is adapted (eg. by a telescopic formation of parts 3, 6) to permit motion of the drill along a drilling direction to advance a drill through an opening in the housing. The housing has a waste outlet 2, an air inlet and the apparatus includes fan means 5 drivingly couplable to the power drill such as to propel air into the cavity in use and hence cause waste material and air to be expelled through the waste outlet. A filter bag or other means may be used to collect the expelled waste.

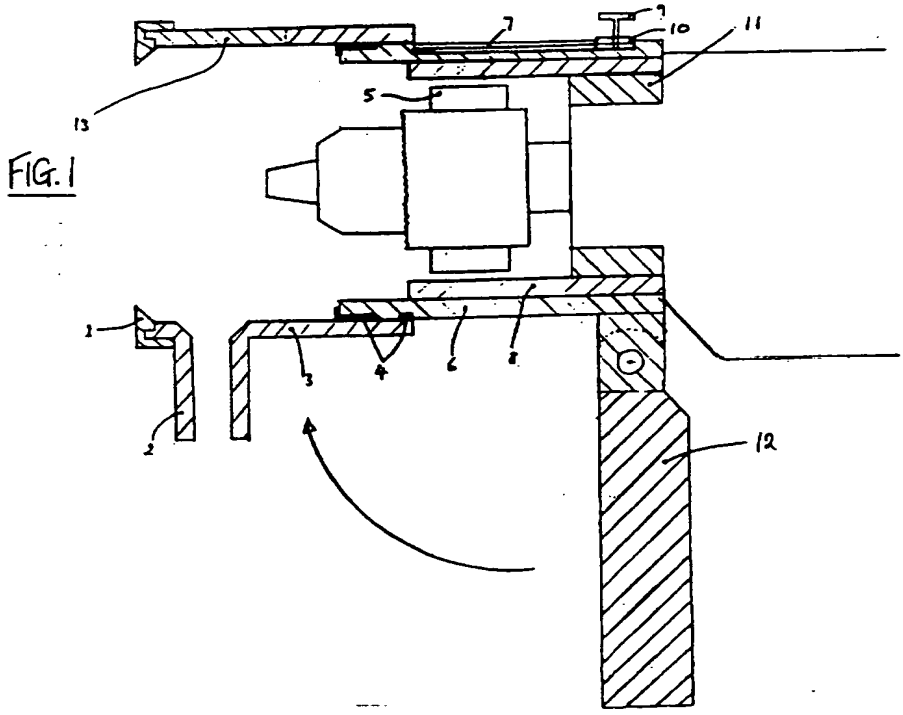


FIG. 1

GB 2 333 478 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

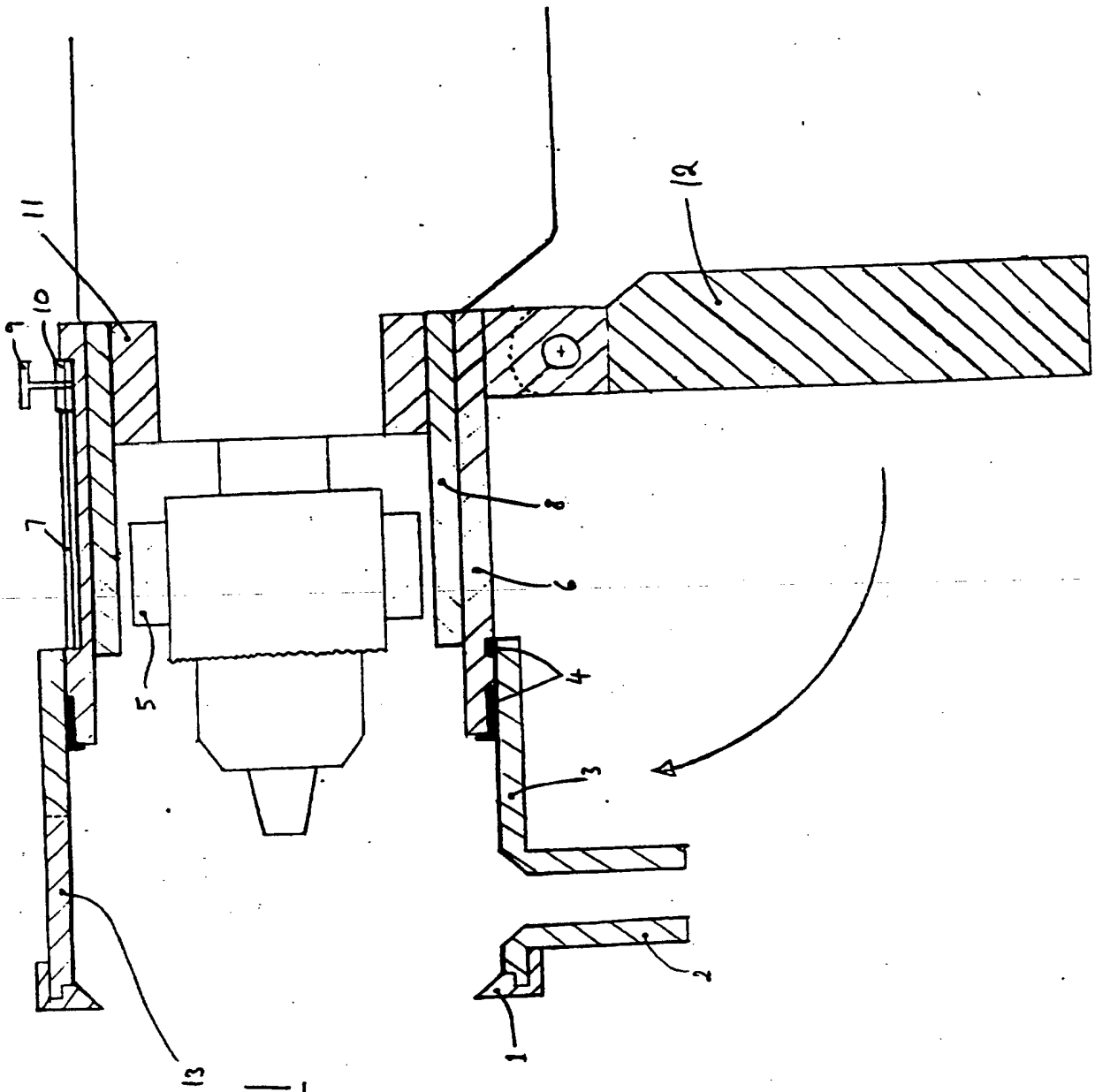


FIG. 1

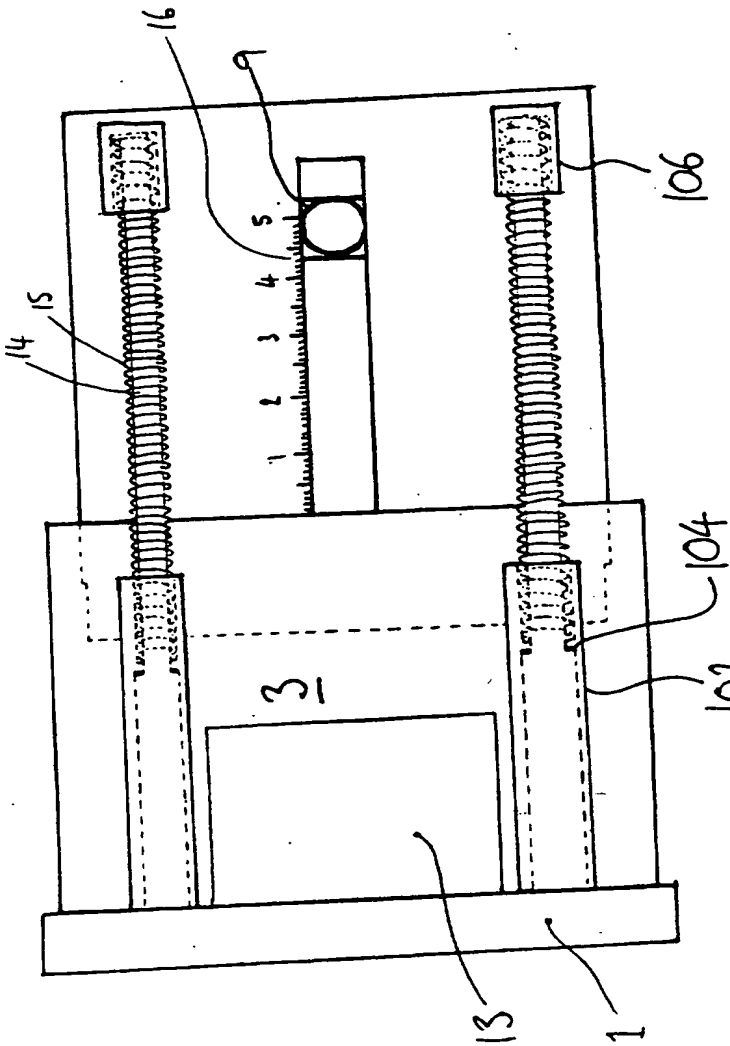


FIG. 2

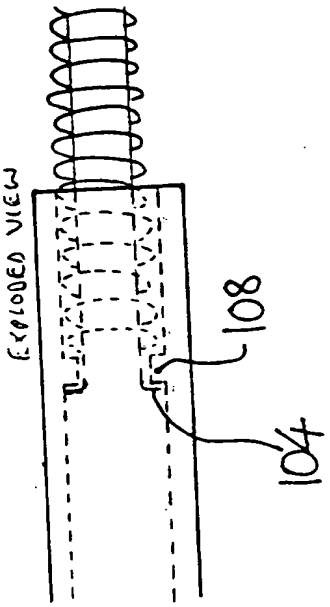


FIG. 2a

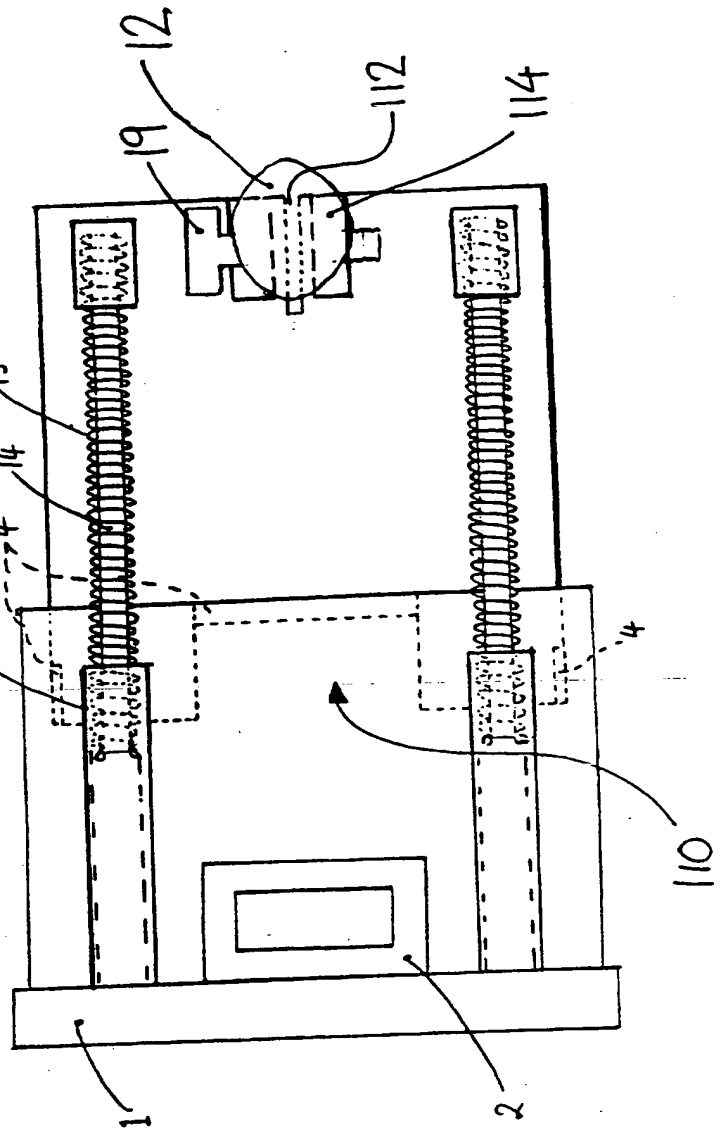


FIG.3

FIG.4

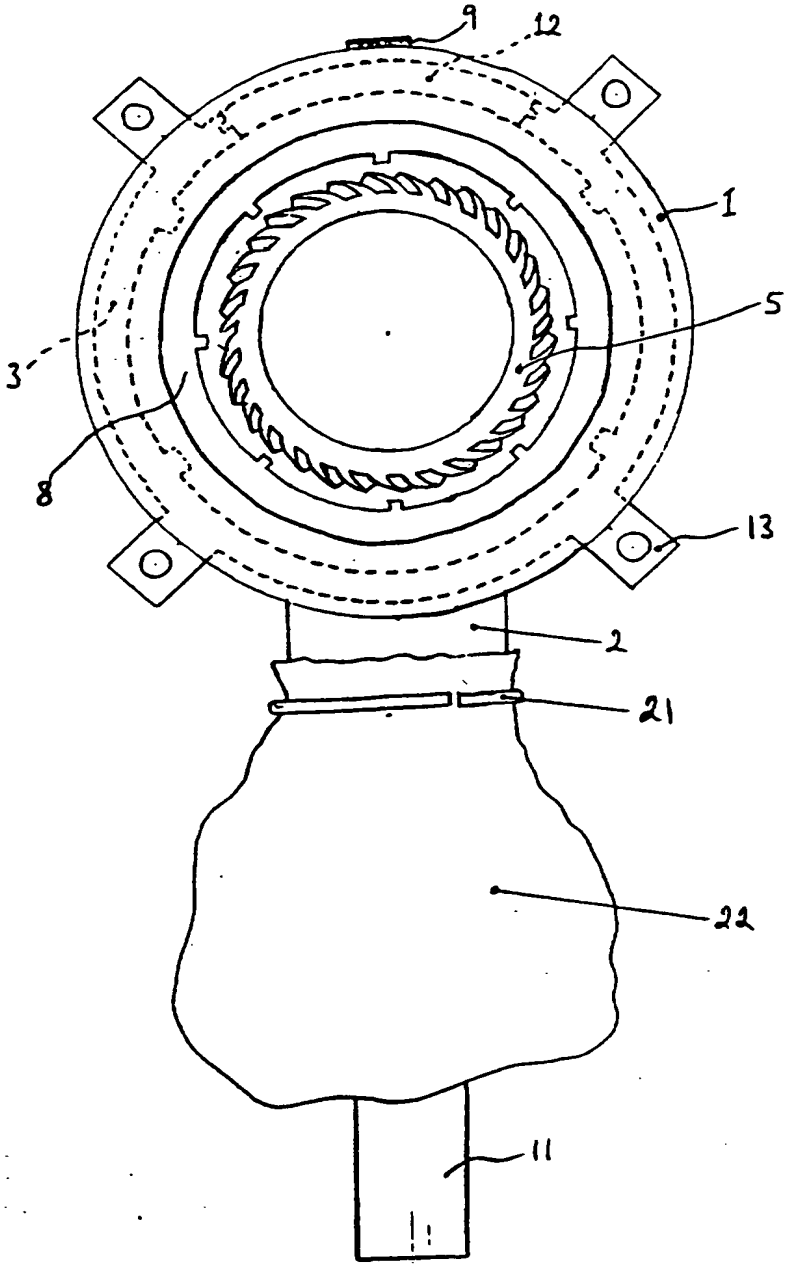


FIG.5

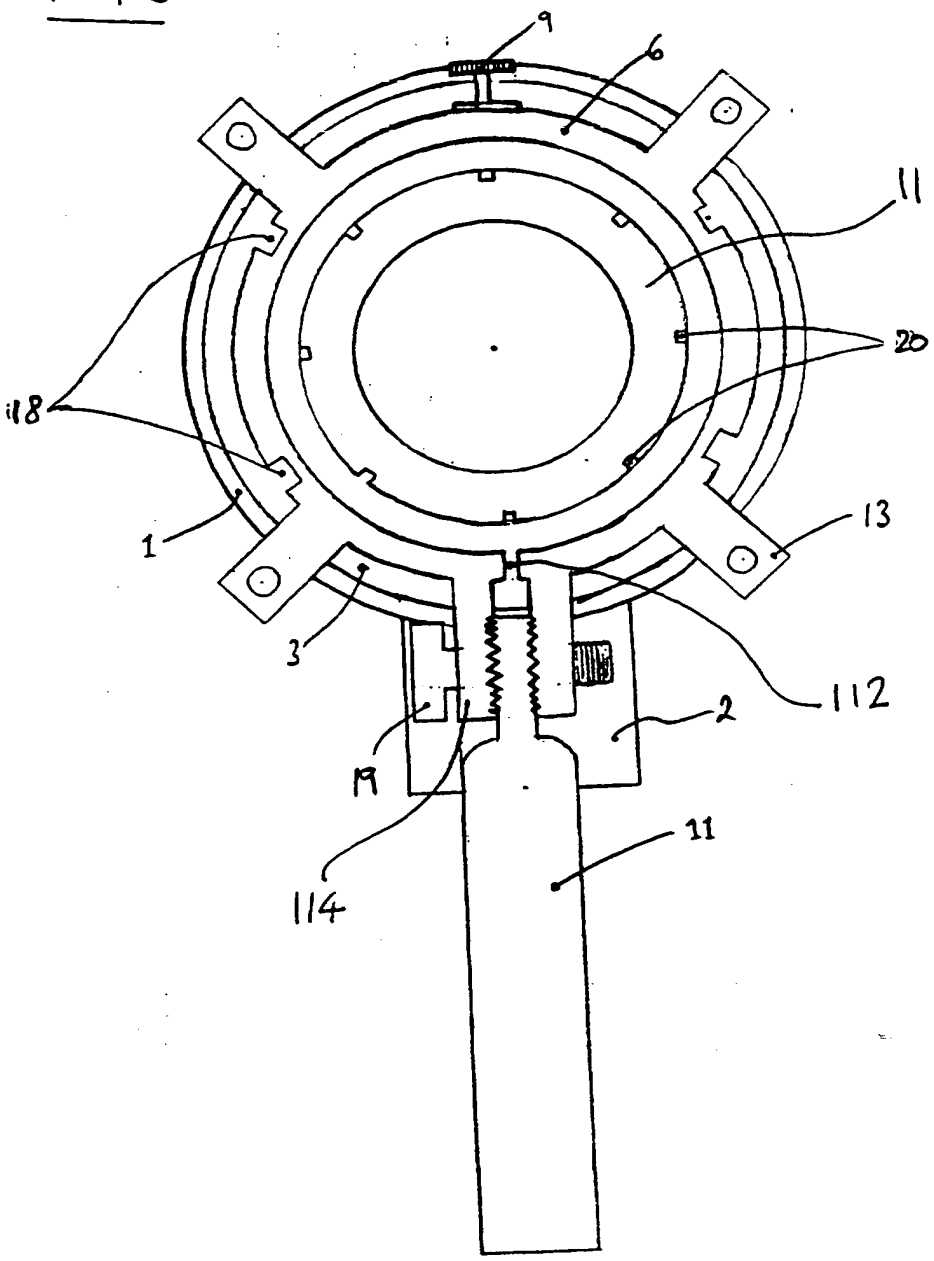


FIG. 6

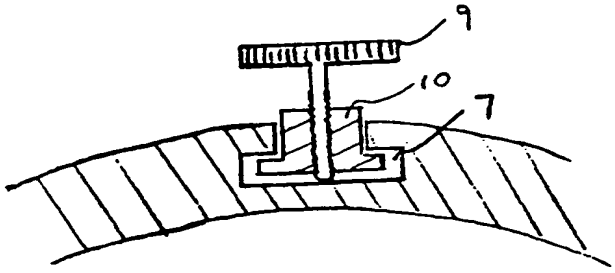
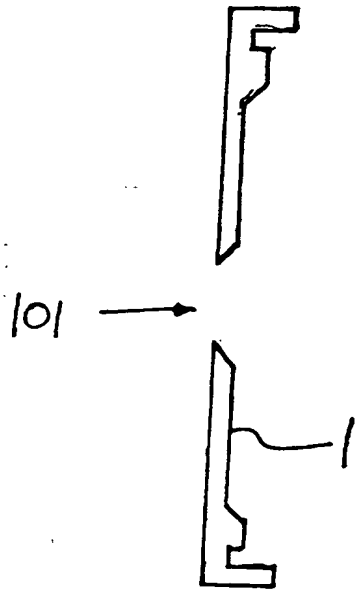


FIG. 7



DESCRIPTION

APPARATUS FOR GUIDING A POWER DRILL

The present invention relates to guides for drills, in particular to apparatus for guiding a hand-held power drill.

There are several difficulties which are frequently experienced when using hand-held power drills (i.e. power drills adapted to be held in the hand whilst drilling).

One existing product designed to assist when drilling a hole with a hand-held electric drill is a depth gauge comprising a plastic handle which slips over the neck of the drill just behind the chuck. Incorporated into the handle is a clamp to tighten it to the neck of the drill. A marked stick is then placed through an off-centre clamp and adjusted roughly to the required drilling depth.

As drilling starts the rotation of the drill bit, particularly on smooth hard surfaces, causes the bit to "waltz" away from the intended point. This often leads to a small hole slightly off the intended point making it very difficult to locate the drill bit back on to the correct point.

As the drill bit nears the required depth, the stick comes up against the drilling surface. However because the stick is positioned slightly off-centre the drill often starts to pivot at the point where the stick rests against the surface, causing the drill to swing away and usually leading to a deeper and wider hole than intended.

Another problem with this known product is that there is no provision

for the collection of the dust and debris produced as a result of the drilling. Not only does this make a mess of the floor and furniture but there is also the hazard of flying debris getting into the eyes as well as the possible health risks associated with inhaling the very fine dust particles produced. To overcome these problems the driller has to wear a face mask and safety goggles. This can lead to further problems if they are long-sighted and rely on spectacles to do close up work, not to mention the inherent problem of goggles steaming up.

There is also the risk, when using an electric drill, of clothing becoming entangled in the chuck.

US Patent 4961674 describes a drill guide adapted for use in surgical operations. This guide will now be described as it appears when oriented for use in drilling a hole vertically downward.

This known guide utilises a telescopic housing comprising a tubular lower part whose bottom edge is placed against the workpiece in use and a cylindrical upper part which is a sliding fit in the lower part. The upper part has a vertical, axial through-going bore which is internally threaded at its upper end for engagement with a drill having a corresponding external thread.

A tension spring is provided within the lower part of the housing and links to the two parts of the housing, tending to move the upper part of the housing upward - ie. to maximise the housing length. To control hole-depth, an exterior surface of the upper part of the housing is threaded and receives an adjusting nut which is thus movable up and down and which abuts an upper edge of the lower housing part to prevent depression of the upper part beyond

a selected point.

In use, a drill bit held in the chuck of the drill projects downward through and beyond the upper housing part. The lower edge of the lower housing part is placed against the bone, then the upper housing part is depressed, against the force of the tension spring, to drill the hole.

The drill guide described in US 4961674 has no provision for collection of waste material produced during drilling. Its housing is open to the exterior via holes through which such waste is likely to be dispersed.

This known guide would also be troublesome when adjusting to accommodate drill bits of different lengths while controlling hole depth.

The mechanism for controlling hole depth is time consuming to adjust, requiring repeated rotation of the adjusting nut.

For all of the above reasons, the above drill guide for surgical use is not well adapted for use in other operations, eg for use with a conventional power drill.

In accordance with a first aspect of the present invention, there is provided apparatus for guiding a hand-held power drill, comprising a housing provided with means for attachment to the drill such that in use the housing may be rested against a workpiece to steady the drill/housing assembly, the housing thereby defining a cavity which receives the waste material produced by drilling, the housing being adapted to permit motion of the drill relative to the workpiece along a drilling direction and having an opening through which a drill bit carried by the drill may be advanced to drill a hole in the workpiece,

the housing also having a waste outlet and an air inlet in communication with the cavity, and the apparatus further comprising fan means drivingly coupled to the power drill such that in use the fan means propel air into the cavity through the inlet causing air and waste material to be expelled through the waste outlet.

Thus, the apparatus according to the present invention can guide the drill and also allow waste to be removed from the vicinity of the drill bit.

Preferably, the waste outlet is connected to waste collection means comprising a filter and an enclosure. The filter and enclosure may be formed as a filter bag. Waste material is blocked by the filter, while the air passes therethrough. The present invention can thus prevent emission of at least a part of the dust and waste produced by drilling certain materials, which can be damaging to health.

It is particularly preferred that the housing is of telescopic construction, and is thereby adapted to permit motion of the drill along the drilling direction. This is constructionally straightforward. Preferably, biassing means are provided which urge the housing to adopt an extended configuration. In use, the drill is pushed by the user toward the workpiece against the force of the biasing means, the housing being maintained in contact with the workpiece.

It is particularly preferred that a movable stop is provided for limiting the extent of motion of one part of the telescopic housing relative to another, and thereby limiting the depth of the hole being drilled. The stop is preferably slidably coupled to one part of the housing and provided with locking means

for selectively locking the stop in position. A depth scale may be provided adjacent the stop, to assist in adjustment.

It is also preferred that the housing bears a handle to be grasped by the user during drilling.

The fan means may take the form of an impeller adapted to be disposed in use on a shaft or chuck of the drill, preferably within the cavity. Such an impeller may be such as to be drivingly coupled to the drill without any modification of the drill.

The means for coupling the drill to the housing are preferably adapted to facilitate removal and re-coupling of the drill from/to the housing. Thus, the drill may be used without the guide when required.

It is preferred that the means for coupling the drill to the housing comprise a collar and adjusting tube securable to the neck of the drill and receivable in or on the housing in such a way that the housing can be adjusted relative to the adjusting tube along the drilling direction. By adjustment of the positioning of the housing, the user can move the tip of the drill bit to a datum position, e.g. to be co-planar with the opening in the housing. In this way, drill bits of various lengths can be used without alteration of the depth setting.

The housing is preferably provided with means for attachment of a gasket, such that the gasket surrounds the aperture in the housing and is positioned to be interposed between the housing and the workpiece in use. The gasket may comprise non-slip or high friction material, to assist in preventing motion of the guide relative to the workpiece. An interchangeable

set of gaskets may be provided, for use with different workpiece materials.

The housing preferably has a window through which the drill bit may be observed.

In accordance with a second aspect of the present invention, there is provided apparatus for guiding a power drill, comprising a housing provided with means for attachment to the drill such that in use the housing may be rested against a workpiece to steady the drill/housing assembly, the housing thereby defining a cavity which receives the waste material produced by drilling, the housing being telescopic and thereby adapted to permit motion of the drill relative to the workpiece along a drilling direction and having an opening through which a drill bit carried by the drill may be advanced to drill a hole in the workpiece.

A specific embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:-

Fig. 1 is a longitudinal section through a drill guide constructed in accordance with the present invention mounted on an electric drill;

Fig. 2 is a view of the same drill guide, without the electric drill, from above;

Fig. 2a is an enlarged view of a spring and rod mechanism forming part of the drill guide;

Fig. 3 is a view of the drill guide from below;

Fig. 4 is a front view of the drill guide, and of an impeller normally

mounted on the chuck of the electric drill;

Fig. 5 is a rear view of the drill guide;

Fig. 6 is a cross section through a portion of a housing of the drill guide, showing a locking mechanism; and

Fig. 7 is a cross section of a special gasket for use with the drill guide.

The illustrated drill guide comprises an expansion collar 11 which fits over the neck of the drill and is designed to remain in place for the lifetime of the drill. It is preferably very tight fitting such that subsequent removal requires gradual levering with a device such as a screwdriver. Around the outside running along the length of the expansion collar are eight equally spaced grooves 20 which, as will be explained below, allow air to be drawn into the guide by an impeller collar 5. The expansion collar 11 is necessary so that an adjusting tube 8 which fits firmly over it is large enough in diameter to house the impeller collar 5.

The internal diameter of the adjusting tube 8 is such that when in place over the expansion collar 11 there should be no appreciable lateral movement, though it must not be so tight fitting that removal becomes very difficult since the user will need to remove it to change drill bits. The adjusting tube 8 may be designed in such a way that extra lengths of tube could be added to it when, for example, one is using an unusually long drill bit. This could be achieved by incorporating a threaded section at the end of the adjusting tube 8 so that an extension piece could be screwed onto it.

The drill guide has a main housing which is telescopic in design, being

formed by an outer housing 3 which is slidably received on an inner housing 6. The two parts of the housing should be a close sliding fit. The housings are prevented from rotation relative to each other by four longitudinal grooves formed on the inner housing 6 which engage with corresponding longitudinal ridges, formed on the outer housing 3 and seen at 18 in Fig. 5. An interchangeable gasket 1 is placed over the front of the outer housing 3. The gasket 1 is selected according to the type of surface being drilled into. A non-slip rubber gasket would be suitable for smooth surfaces whereas one with an additional foam rubber layer would be more suitable when drilling through brick because it would mould to the contours of the brick surface. A special gasket would be selected (see Fig. 7) in the instance when the user needs to drill a hole into a workpiece that is physically narrower in dimension than the external diameter of outer housing 3. This gasket has increased surface area, and only a small aperture 101 through which the drill passes

The inner housing 6 is formed as a split ring, having a longitudinally extending slot or divide 112 (see Fig. 5) on either side of which are respective radially extending lugs 114 connected by a clamping screw 19 which serves to tighten the housing to secure it to the adjusting tube 8 and also to lock in position the handle 12, a portion of which is disposed between the lugs 114, being pivotally mounted on the screw. When not in use, or if the user prefers not to use the handle 12, it can be folded away into its storage position alongside of the main body of the device.

A velvet ring 4 is provided on the exterior of the inner housing 6 so

that small dust particles are prevented from getting in between the two housings and causing them to grind against each other or even become seized.

At the exterior of the main housing are provided four biasing mechanisms. Each such mechanism comprises, in the illustrated embodiment, a longitudinally extending tube 102 which is formed on the exterior of the outer housing 3 and receives a rod 14, having at one of its ends, within the tube 102, a shoulder 104. The end of the rod remote from the tube 102 is secured by means of a fixing block 106 to the exterior of the inner housing 6, so that when the two parts of the housing are slid relative to each other, the rod 14 correspondingly slides within its tube. The fixing block is an integral part of the housing. The rod is prevented from sliding fully out of its tube by abutment of the shoulder 104 against a restraining cuff 108 within the tube 102 (see in particular Fig. 2a) and in this way sliding of the inner housing 6 fully out of the outer housing 3 is also prevented.

Each biasing mechanism further comprises a spring, formed in the illustrated embodiment as a helical spring acting in compression and restrained between the cuff 108 and the fixing block 106. The effect of the springs is to urge the two parts of the housing apart to the full extent of their travel - i.e. to maximise the length of the telescopic housing.

In this way, the biasing mechanisms provide the force required to keep the gasket 1 of the outer housing 3 pressed against the drilling surface as drilling progresses. The user may be required to restrain the outer housing 3 against the surface at the start of the drilling process whilst the initial hole is

being drilled. This would be achieved by using the free hand to hold the outer housing 3 firmly against the drilling surface. Once an initial hole has been made, thereby preventing subsequent lateral motion of the electric drill and the housing relative to the work-piece, the user can revert to holding the handle 12 provided on the inner housing 6.

Incorporated into the outer housing 3 is an inspection window 13. This aids the user in the initial positioning of the drill bit and allows the user to monitor the drilling process. The window may be made of plastic and so may become scratched and opaque after extensive use, and so is preferably replaceable. Also incorporated into the outer housing 3 is an outlet 2 for dust and debris. Attached to the neck of the outlet 2 by means of a strong metal split ring 21 (see Fig. 4) is an air filter bag 22 which will allow air to be expelled while at the same time catching the dust and debris.

The inner housing 6 has a rectangular slot (seen at 110 in Fig. 3) cut into it so that as the outer housing 3 slides over it, the dust outlet 2 is not closed by the inner housing 6. The inner housing 6 also incorporates an adjustable depth gauge which allows the user to accurately set the drilling depth. The illustrated embodiment allows the user to set depths up to 5cm. The depth gauge comprises a channel 7 (see Figs. 1 and 6) along which slides a plate 10 having a locking screw 9, using which the user can lock the plate 10 up against the retaining ridges of the channel 7.

When the hole reaches the required depth, the plate 10 contacts the outer housing 3, preventing further motion of the inner housing 6 in the

drilling direction.

It should be noted here that it is possible to drill deeper holes if so required, by first drilling to 5cm depth and then adjusting the housing along the adjusting tube 8 by the extra amount of depth required. The adjusting tube 8 has a marked scale on it to help the user to do this.

The impeller collar 5 is fitted to the chuck as seen in Fig. 1 and held in place by three radial grub screws equally spaced around it and screwed into the collar itself. It is intended to stay in position for the life-time of the drill. During drilling the rotation of impeller collar 5 causes motion of air in a forward direction (i.e. a direction toward the work-piece), thus drawing air along the grooves 20 into the housing. This keeps the dust away from the chuck and drill mechanism and causes it to exit through the dust outlet 2 into the air filter bag 22. It should be noted that drills could be designed with a wider neck incorporated into the mould of the body as well as having the impeller incorporated into the moulding of the chuck.

To use the drill guide, the expansion collar 11 must firstly be put in place over the neck of the drill. Then the impeller collar 5 should be slipped over the chuck and secured by tightening the grub screws. The drill bit to be used should then be inserted into the chuck and the chuck tightened. The adjusting tube 8 can now be slipped over the expansion collar 11 and then the housing over the adjusting tube 8. The housing should be adjusted along the length of the adjusting tube 8 in such a way that the tip of the drill bit is parallel with the leading edge of the gasket 1. The easiest way to ensure this

is to rest the tip of the drill bit vertically downwards onto a work surface and then slide the housing down until gasket 1 meets the surface. The handle and clamp locking screw 19 can then be tightened.

The depth gauge should be adjusted to the required depth. If drilling a hole for a wall plug one may simply place the plug into the depth gauge channel 7 and then slide the plate 10 up to it before tightening locking screw 9.

By looking through the inspection window 13 the user can locate the drill bit over the desired drilling point. For extra stability and accuracy during the initial drilling the user should use his/her spare hand to hold the outer housing 3 firmly against the drilling surface. Once a small hole has been made the user can, if desired, complete the task using the handle 12. If the depth required is greater than 5cm then after the initial 5cm has been drilled the user should move the housing back along adjusting tube 8 towards the body of the drill by the extra depth required using the marked scale on the adjusting tube 8.

If the drill bit needs to be changed the user should remove the adjusting tube 8 with the housing still attached to it, change the bit, and then slip the adjusting tube 8 back on as before. Of course an adjustment of the housing along the adjusting tube 8 will now be necessary if the new bit is of a different length.

Because all of the moving parts of the drill are enclosed by this device, the user is automatically protected from flying debris and the possible hazard

of getting clothing caught in the rotating drill. This means that the user does not have to wear safety goggles (which often steam up on humid days), a face mask or special protective clothing.

CLAIMS

1. Apparatus for guiding a hand-held power drill, comprising a housing provided with means for attachment to the drill such that during drilling the housing may be rested against a workpiece to steady the drill/housing assembly, thereby defining a cavity which receives the waste material produced by drilling, the housing being adapted to permit motion of the drill relative to the workpiece along a drilling direction and having an opening through which a drill bit carried by the drill is advanced during drilling, the housing also having a waste outlet and an air inlet in communication with the cavity, and the apparatus further comprising fan means drivingly couplable to the power drill such that in use the fan means propel air into the cavity through the inlet causing air and waste material to be expelled through the waste outlet.

2. Apparatus as claimed in claim 1, wherein the waste outlet is connected to waste collection means comprising a filter and an enclosure.

3. Apparatus as claimed in claim 2, wherein the filter and enclosure are formed by a filter bag.

4. Apparatus as claimed in any preceding claim, wherein the housing is telescopic, and thereby adapted to permit motion of the drill along the drilling direction.

5. Apparatus as claimed in claim 4, further comprising biassing means which urge the housing to adopt an extended configuration.

6. Apparatus as claimed in claim 4 or claim 5, further comprising a

movable stop for limiting the extent of motion of one part of the telescopic housing relative to another and thereby limiting the depth of a drilled hole.

7. Apparatus as claimed in claim 6, wherein the stop is slidably coupled to one part of the housing and provided with locking means for selectively locking the stop in position.

8. Apparatus as claimed in claim 7, further comprising a depth scale adjacent the stop.

9. Apparatus as claimed in any preceding claim, wherein the housing is provided with a handle which can be held by the user during drilling.

10. Apparatus as claimed in any preceding claim wherein the fan means comprises an impeller adapted to be disposed in use on a shaft or chuck of the drill.

11. Apparatus as claimed in any preceding claim, wherein the means for attachment of the housing to the drill comprise a collar and adjusting tube securable to the neck of the drill and receivable in or on the housing in such a way that the housing can be adjusted relative to the adjusting tube along the drilling direction.

12. Apparatus as claimed in any preceding claim, further comprising a gasket attached to the housing such as to surround the aperture in the housing and to be interposed between the housing and the workpiece during drilling.

13. Apparatus as claimed in claim 12, wherein the gasket comprises non-slip or high friction material.

14. Apparatus as claimed in any preceding claim, wherein the housing

has a window through which the drill bit may be observed.

15. Apparatus for guiding a hand-held power drill substantially as herein described, with reference to, and as illustrated in, the accompanying drawings.

The Patent Office

17.

INVESTOR IN PEOPLE

Application No: GB 9801129.9
Claims searched: 1-15

Examiner: Hal Young
Date of search: 23 March 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B3C ; B4C ; F4X

Int Cl (Ed.6): B08B(15/04) ; B23B(47/34) ; B23Q(11/00) ; B25D(17/14, 18, 20, 28)

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB 2319600 A	(BRITISH)	
A	GB 2309660 A	(BOSCH)	
A	GB2130715 A	(DESOUTTER)	
A	WO 95/20440 A1	(SCOTT)	
X	WO 95/17992 A1	(HORKOS), see figs.	1,4,5
X	US 5356245	(FUJI), see fig 1.	1,2,4,5,9
X	US 5033917	(McDONNELL), see fig 1.	1,4,5,9

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.